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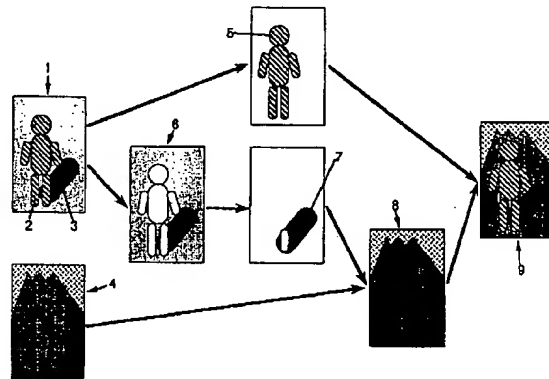
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(54) 【発明の名称】 電子画像における影の合成方法

(57) 【要約】

【目的】 クロマキーによる画像合成において、主要部の画像と背景画像を異和感なく、短時間で合成する方法を提供する。

【構成】 ブルーバックの前で撮影した画像1の中からクロマキーによって、主要部の画像2を抜き取って主要部の画像データ5を作成する。次に、ブルーバック部分の画像データ6の平均輝度を算出する。主要部の影の部分は該画像データ6に含まれていが、影の部分の輝度値は平均輝度値よりも低いので、しきい値輝度によって影の部分の位置情報及び輝度情報7が得られる。次に合成後の背景となる背景画像4の画像データに主要部の画像2の合成位置周縁で主要部の影3が入る部分の輝度データを前記主要部の影の位置情報と輝度情報7によって修正し、合成後の画像の中に主要部の影が付加された背景画像データ8を作成する。該背景画像8に主要部の画像データ5を加えて最終画像データ9を得る。



## 【特許請求の範囲】

【請求項1】 クロマキーによる画像合成において、少なくとも単一色のバックの前で撮影した画像データから主要部を抜き出し、残されたバックデータから影の部分の位置情報と輝度情報を求める工程と、合成後背景となる画像データに主要部の合成位置周縁で主要部の影が入る部分の背景画像部の輝度データを前記主要部の影の位置情報と輝度情報によって修正し、主要部合成後の画像の中に主要部の影の部分をつ加する工程を有することを特徴とする電子画像における影の合成方法。

【請求項2】 前記バックデータから影の部分の位置情報と輝度情報を求める工程として、画像のデータの主要部を抜き出し、残されたバックデータの平均輝度値を求め、該平均輝度値より低い輝度部分を主要部の影の部分として位置情報及び輝度情報を求めることを特徴とする請求項1記載の電子画像における影の合成方法。

【請求項3】 前記バックデータから影の部分の位置情報と輝度情報を求める工程として、あらかじめバックの平均的な輝度値と主要部の影になる部分の平均的な輝度値を求めておいて、両輝度値の間の数値により主要部の影の部分として見なせる部分の位置情報及び輝度情報を求めることを特徴とする請求項1記載の電子画像における影の合成方法。

【請求項4】 前記バックデータから影の部分の位置情報と輝度情報を求める工程として、画像データの主要部を抜き出し、残されたバックデータの輝度分布の最多値を求め、該最多値より低い輝度部分を主要部の影の部分として位置情報及び輝度情報を求めることを特徴とする請求項1記載の電子画像における影の合成方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 クロマキーによる画像合成において、主要部の画像と背景画像を異和感なく、短時間で合成できる電子画像の合成方法に関する。

## 【0002】

【従来の技術】 従来から、電子画像における画像合成は、CRT上で単一色のバックの前で撮像した主要部の画像を表示し、バック上の一点あるいは複数点の色を指定して主要部を抜き取り、背景となる別の画像の一部にはめ込む、いわゆるクロマキーが使われている。

## 【0003】

【発明が解決しようとする課題】 衆知のごとく、クロマキーによれば、バックの色を指定して主要部の切り出しを行うため、撮影時の主要部人物等の周縁の影は消されてしまい、合成画像上の人物と背景の距離が不連続であれば気にならないが、連続的である場合は影の無い所謂切り貼りの不自然な画像になってしまう。又、不自然さを解消するには、画像処理ワークステーション上で絵心のある熟練者が手書きで影をつ加する必要がある、時間が掛かっていた。

## 【0004】

【課題を解決しようとする手段】 本発明の請求項1に係わる電子画像における影の合成方法は、クロマキーによる画像合成において、少なくとも単一色のバックの前で撮影した画像データから主要部を抜き出し、残されたバックデータから影の部分の位置情報と輝度情報を求める工程と、合成後背景となる画像データに主要部の合成位置周縁で主要部の影が入る部分の背景画像部の輝度データを前記主要部の影の位置情報と輝度情報によって修正し、主要部合成後の画像の中に主要部の影の部分をつ加する工程を有することを特徴とする。

【0005】 本発明の請求項2に係わる電子画像における影の合成方法は、請求項1記載の電子画像における影の合成方法であって、前記バックデータから影の部分の位置情報と輝度情報を求める工程として、画像のデータの主要部を抜き出し、残されたバックデータの平均輝度値を求め、該平均輝度値より低い輝度部分を主要部の影の部分として位置情報と輝度情報を求めることを特徴とする。

【0006】 本発明の請求項3に係わる電子画像における影の合成方法は、請求項1記載の電子画像における影の合成方法であって、前記バックデータから影の部分の位置情報と輝度情報を求める工程として、あらかじめバックの平均的な輝度値と主要部の影になる部分の平均的な輝度値を求めておいて、両輝度値の間の数値により主要部の影の部分として見なせる部分の位置情報と輝度情報を求めることを特徴とする。

【0007】 本発明の請求項4に係わる電子画像における影の合成方法は、請求項1記載の電子画像における影の合成方法であって、前記バックデータから影の部分の位置情報と輝度情報を求める工程として、画像データの主要部を抜き出し、残されたバックデータの輝度分布の最多値を求め、該最多値より低い輝度部分を主要部の影の部分として位置情報及び輝度情報を求めることを特徴とする。

## 【0008】

【作用】 主要部の画像、例えば人物等をクロマキー用ホリゾンバック前で撮影する際に、背景となる合成画像の照明光源に近い位置にメインライトを置くことにより、バックの床面及び又は壁面に主要部人物等に連続した影を作り、影の部分の位置情報と輝度情報を取り出して合成背景上に影を挿入する位置の輝度情報を修正して影をつ加することにより極自然な影をつ加することが出来る。

## 【0009】

【実施例】 本発明を図面に従って、詳細に説明する。図1は本発明を説明する概念図である。図1において、1は例えばブルーバックの前で撮影した画像であり、2は主要部の画像、3はブルーバックの床面及び又は壁面に出来た影の画像である。4は背景として合成する画像で

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ある。5はクロマキーにより抜き取ったブルー以外の主要部の画像データであり、6は主要部5を抜き取った後のブルー部分の画像データである。撮影時の影はブルー部分の画像データ6に含まれている。

【0010】以下、本発明の一実施例について述べる。ブルーバック部分の画像データ6の平均輝度を算出する。影の部分は輝度が低くなるから、平均輝度値よりも輝度が低い部分、即ち影の部分の位置情報及び輝度情報7を得る。ここで、主要部の占める位置の輝度データは平均値算出に加えないことが望ましい。しかし、合成画像上の影の濃さはブルーバック上の影の濃さと関連が少ないので、計算時間を節減するために、主要部データも計算に含めて平均輝度を算出して影の部分の輝度データを求め、合成画像上の影に使う輝度情報としては視覚的に確認の上、係数を掛けて使うことも有用である。

【0011】また、影の輝度情報は平均輝度値との比として数値化して用いることも可能である。また、主要部を撮影する場所とライティングが限定されている場合には、演算時間を短縮する目的で、事前に撮影した画像データからブルーバック部の平均的な輝度と主要部の影の部分の平均的な輝度を把握しておき、両輝度の間の輝度値をしきい値として影の部分の位置情報と輝度情報を求めることも可能である。更に、主要部以外のブルーバック部は、影の部分を除いて殆ど一様な色と輝度を示すから、ブルーバック部の輝度分布データの最大値を求め、該最大値の示す輝度より低い輝度部を影の部分として検出して位置情報と輝度情報を求めることも可能である。

【0012】次に、合成後の背景となる背景画像4の画像データに主要部の画像2の合成位置周縁で主要部の影3が入る部分の輝度データを前記主要部の影の位置情報と輝度情報7によって修正し、合成後の画像の中に主要部の影の部分が付加される背景画像データ8を作成す

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る。該背景画像データ8に主要部の画像データ5を加えて最終合成画像データ9を得る。合成する主要部2の大きさを背景画像4との関係で変更する場合は、影の部分の位置データを修正して用いることも容易である。さらに、合成する背景画像4の地面及び又は壁面に段差などがある場合に、あらかじめ影の位置データを変形して背景の状況に合わせた形に修正して用いることや、部分的な修正を人手を掛けて直しておくことも可能である。最終合成データ9によりプリントアウトを行えばハードコピーを得ることはいとも容易に出来る。

【0013】

【発明の効果】本発明の方法によれば、合成画像上の主要部の人物等と背景の距離が連続的であっても、撮像時に出来る影を合成画像上の人物等の周縁に、簡単に短時間で合成出来る。しかもプリント上の影がかもし出す雰囲気は極自然であり、多くの観客者に主要人物等があたかもその場に参画した感じを抱かせる。短時間で、簡単に高品質の合成画像が得られる技術を利用して、博覧会や展示会等におけるイベント用の高品質の合成プリントとして、期待に応えるところが大である。

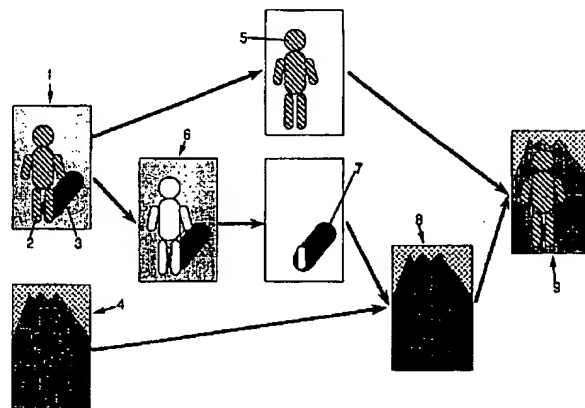
【図面の簡単な説明】

【図1】本発明を説明する概念図である。

【符号の説明】

- 1 ブルーバックの前で撮影した画像
- 2 主要部の画像
- 3 影の画像
- 4 背景画像
- 5 主要部の画像データ
- 6 ブルーバック部分の画像データ
- 7 影の位置情報と輝度情報
- 8 背景画像データ
- 9 最終合成画像データ

【図1】



PAT-NO: JP406339150A

DOCUMENT-IDENTIFIER: JP 06339150 A

TITLE: COMPOSITING METHOD OF SHADE IN  
ELECTRONIC PICTURE

PUBN-DATE: December 6, 1994

INVENTOR-INFORMATION:

NAME

MATSUI, HARUO

INT-CL (IPC): H04N009/75, G06F015/66 , H04N001/387

ABSTRACT:

PURPOSE: To composite a picture of a major part and a background picture without a sense of incongruity in a short time in the picture composition by chroma key.

CONSTITUTION: Picture data 5 of a major part are generated by extracting a picture 2 of the major part from a picture 1 picked up in front of a blue background by chroma key. Then average brightness of picture data 6 of the blue background part is calculated. The shade of the major part is included in said picture data 6 and since the brightness of the shade part is lower than the average brightness, position information and brightness information 7 of the shade part are obtained based on a threshold brightness. Then brightness data resulting from including the shade 3 of the major part at the circumferential ridge of the synthesized position of the picture 2 of the major part to the picture data of a background picture 4 being a background after synthesis are corrected by position information and

brightness information 7 of  
the major part and background picture data 8 formed by  
adding the shade of the  
major part in the picture after synthesis are generated.  
Final picture data 9  
are obtained by adding the picture data 5 of the major part  
to the background  
picture 8.

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TECHNICAL FIELD

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[Industrial Application] In the image composition by the chroma-key, it is related with the synthetic approach of the electronic image which there is no feeling of the different sum and can compound the image and background image of the body in a short time.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] The shadow of peripheries, such as a body person at the time of photography, will be erased, in order to specify the back's color and to start the body like well-known according to the chroma-key, if the person on a synthetic image and its distance of a background are discontinuous, it is not worried, but when continuous, it will become the so-called unnatural image of shadowless \*\*\*\*\*. Moreover, in order to have canceled unnaturalness, the expert who has \*\*\*\* on an image-processing workstation needed to add the shadow in handwriting, and it had taken time amount.

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PRIOR ART

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[Description of the Prior Art] The so-called chroma-key inserted in some another images which the image composition in an electronic image displays the image of the body picturized before the back of a single color on CRT, and specify the color of one point or two or more points on the back, sample the body, and serve as a background from the former is used.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is a conceptual diagram explaining this invention.

[Description of Notations]

1 Image Photoed before Blue Back

2 Image of Body

3 Image of Shadow

4 Background Image

5 Image Data of Body

6 Image Data of Blue Back Part

7 Positional Information and Brightness Information of Shadow

8 Background-Image Data

9 The Last Composition Image Data

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] In the image composition by the chroma-key, it is related with the synthetic approach of the electronic image which there is no feeling of the different sum and can compound the image and background image of the body in a short time.

[0002]

[Description of the Prior Art] The so-called chroma-key inserted in some another images which the image composition in an electronic image displays the image of the body picturized before the back of a single color on CRT, and specify the color of one point or two or more points on the back, sample the body, and serve as a background from the former is used.

[0003]

[Problem(s) to be Solved by the Invention] The shadow of peripheries, such as a body person at the time of photography, will be erased, in order to specify the back's color and to start the body like well-known according to the chroma-key, if the person on a synthetic image and its distance of a background are discontinuous, it is not worried, but when continuous, it will become the so-called unnatural image of shadowless \*\*\*\*\*. Moreover, in order to have canceled unnaturalness, the expert who has \*\*\*\* on an image-processing workstation needed to add the shadow in handwriting, and it had taken time amount.

[0004]

[Means for Solving the Problem] The synthetic approach of the shadow in the electronic image concerning claim 1 of this invention The process which extracts the body from the image data photoed before the back of a single color at least, and searches for the positional information and brightness information of a part of a shadow from the left-behind back data in the image composition by the chroma-key, The brightness data of the background-image section of a part with which the shadow of the body goes into the image data used as a synthetic backward background in the synthetic location periphery of the body are corrected by the positional information and brightness information of a shadow of said body, and it is characterized by having the process which adds the part of the shadow of the body into the image after body composition.

[0005] The synthetic approach of the shadow in the electronic image concerning claim 2 of this invention is the synthetic approach of the shadow in an electronic image according to claim 1, extracts the body of the data of an image and is characterized by to calculate the average-luminance value of the left-behind back data, and to search for positional information and brightness information as a part of the shadow of the body for a brightness part lower than this average-luminance value as a process which searches for the positional information and the brightness information of a part of a shadow from said back data.

[0006] The synthetic approach of the shadow in the electronic image concerning claim 3 of this invention As a process which is the synthetic approach of the shadow in an electronic image according to claim 1, and searches for the positional information and brightness information of a part of a shadow

from said back data It is characterized by calculating the average brightness value of the part which becomes the back's average brightness value and the shadow of the body beforehand, and searching for the positional information and brightness information of the part which can be regarded as a part of the shadow of the body by the numeric value between both brightness values.

[0007] The synthetic approach of the shadow in the electronic image concerning claim 4 of this invention is the synthetic approach of the shadow in an electronic image according to claim 1, extracts the body of image data and is characterized by to calculate the most values of the luminance distribution of the left-behind back data, and to search for positional information and brightness information for a brightness part lower than these most values as a part of the shadow of the body as a process which searches for the positional information and the brightness information of a part of a shadow from said back data.

[0008]

[Function] By putting the Maine light on the location near [ in case the image of the body, for example, a person etc., is photoed in front of Horizon Toback for chroma-keys ] the source of the illumination light of the synthetic image used as a background The shadow which followed the body person etc. can be made on the back's floor line and/or wall surface, and a very natural shadow can be added by correcting the brightness information of the location which takes out the positional information and brightness information of a part of a shadow, and inserts a shadow on a synthetic background, and adding a shadow.

[0009]

[Example] This invention is explained to a detail according to a drawing. Drawing 1 is a conceptual diagram explaining this invention. the image which photoed 1 before the blue back in drawing 1 -- it is - 2 -- the image of the body, and 3 -- the blue back's floor line -- and -- or it is the image of the shadow made on the wall surface. 4 is an image compounded as a background. 5 is the image data of the bodies other than the blue sampled by the chroma-key, and 6 is the image data of the blue part after sampling the body 5. The shadow at the time of photography is included in the image data 6 of a blue part.

[0010] Hereafter, one example of this invention is described. The average luminance of the image data 6 of a blue back part is computed. Since brightness becomes low, the part of a shadow acquires the positional information and brightness information 7 of a part with brightness lower than an average luminance value, i.e., the part of a shadow. Here, as for the brightness data of the location which the body occupies, not adding to averaging is desirable. However, since there are little the thickness and relation of a shadow on the blue back, in order that they may reduce computation time, as for the thickness of the shadow on a synthetic image, it is also visually [ as brightness information which computes average luminance by including body data in count, asks for the brightness data of the part of a shadow, and is used for the shadow on a synthetic image ] useful that it uses after a check, applying a multiplier.

[0011] Moreover, it evaluates as a ratio with an average luminance value, and the brightness information of a shadow can also be used. Moreover, it is also possible to be the object which shortens the operation time when the location and lighting which photo the body are limited, to grasp the average brightness of the blue back section and the average brightness of the part of the shadow of the body from the image data picturized in advance, and to search for the positional information and brightness information of a part of a shadow by making the brightness value between both brightness into a threshold. Furthermore, since the blue back sections other than the body show almost uniform color and brightness except for the part of a shadow, the most values of the luminance distribution data of the blue back section are calculated, the brightness section lower than the brightness which these most values show is detected as a part of a shadow, and they can also search for positional information and brightness information.

[0012] Next, the brightness data of a part with which the shadow 3 of the body goes into the image data of the background image 4 used as the background after composition in the synthetic location periphery of the image 2 of the body are corrected by the positional information and brightness information 7 of a shadow of said body, and the background-image data 8 with which the part of the shadow of the body is added into the image after composition are created. The image data 5 of the body is added to these

background-image data 8, and the last composition image data 9 is obtained. When changing the magnitude of the body 2 to compound by relation with a background image 4, it is also easy to correct and use the location data of the part of a shadow. furthermore, the ground surface of the background image 4 to compound -- and -- or when a level difference etc. is in a wall surface, it is also possible to correct and use for the form which transformed the location data of a shadow beforehand and was doubled with the situation of a background, or to hang a help and to correct modification. If it prints out with the last complex data 9, it can perform obtaining hard copy very easily.

[0013]

[Effect of the Invention] According to the approach of this invention, even if the person of the body on a synthetic image etc. and the distance of a background are continuous, the shadow made at the time of an image pick-up is easily compoundable to peripheries, such as a person on a synthetic image, in a short time. And the ambient atmosphere which the shadow on a print brews is pole nature, and the leading figure etc. makes many observers have the sensibility in which it took part on that occasion. The place which meets the expectation as a synthetic print of the high quality for events in an exposition, a show, etc. for a short time using the technique in which the synthetic image of high quality is obtained simply is size.

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OPERATION

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[Function] The Main light is put on the location near [ in case the image of the body, for example, a person etc., is photoed in front of Horizon Toback for chroma-keys ] the source of the illumination light of the synthetic image used as a background, The shadow which followed the body person etc. can be made on the back's floor line and/or wall surface, and a very natural shadow can be added by correcting the brightness information of the location which takes out the positional information and brightness information of a part of a shadow, and inserts a shadow on a synthetic background, and adding a shadow.

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## EXAMPLE

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[Example] This invention is explained to a detail according to a drawing. Drawing 1 is a conceptual diagram explaining this invention. the image which photoed 1 before the blue back in drawing 1 -- it is - 2 -- the image of the body, and 3 -- the blue back's floor line -- and -- or it is the image of the shadow made on the wall surface. 4 is an image compounded as a background. 5 is the image data of the bodies other than the blue sampled by the chroma-key, and 6 is the image data of the blue part after sampling the body 5. The shadow at the time of photography is included in the image data 6 of a blue part.

[0010] Hereafter, one example of this invention is described. The average luminance of the image data 6 of a blue back part is computed. Since brightness becomes low, the part of a shadow acquires the positional information and brightness information 7 of a part with brightness lower than an average luminance value, i.e., the part of a shadow. Here, as for the brightness data of the location which the body occupies, not adding to averaging is desirable. However, since there are little the thickness and relation of a shadow on the blue back, in order that they may reduce computation time, as for the thickness of the shadow on a synthetic image, it is also visually [ as brightness information which computes average luminance by including body data in count, asks for the brightness data of the part of a shadow, and is used for the shadow on a synthetic image ] useful that it uses after a check, applying a multiplier.

[0011] Moreover, it evaluates as a ratio with an average luminance value, and the brightness information of a shadow can also be used. Moreover, it is also possible to be the object which shortens the operation time when the location and lighting which photo the body are limited, to grasp the average brightness of the blue back section and the average brightness of the part of the shadow of the body from the image data picturized in advance, and to search for the positional information and brightness information of a part of a shadow by making the brightness value between both brightness into a threshold. Furthermore, since the blue back sections other than the body show almost uniform color and brightness except for the part of a shadow, the most values of the luminance distribution data of the blue back section are calculated, the brightness section lower than the brightness which these most values show is detected as a part of a shadow, and they can also search for positional information and brightness information.

[0012] Next, the brightness data of a part with which the shadow 3 of the body goes into the image data of the background image 4 used as the background after composition in the synthetic location periphery of the image 2 of the body are corrected by the positional information and brightness information 7 of a shadow of said body, and the background-image data 8 with which the part of the shadow of the body is added into the image after composition are created. The image data 5 of the body is added to these background-image data 8, and the last composition image data 9 is obtained. When changing the magnitude of the body 2 to compound by relation with a background image 4, it is also easy to correct and use the location data of the part of a shadow. furthermore, the ground surface of the background image 4 to compound -- and -- or when a level difference etc. is in a wall surface, it is also possible to correct and use for the form which transformed the location data of a shadow beforehand and was doubled with the situation of a background, or to hang a help and to correct modification. If it prints out with the last complex data 9, it can perform obtaining hard copy very easily.

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MEANS

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[Means for Solving the Problem] The synthetic approach of the shadow in the electronic image concerning claim 1 of this invention, The process which extracts the body from the image data photoed before the back of a single color at least, and searches for the positional information and brightness information of a part of a shadow from the left-behind back data in the image composition by the chroma-key, The brightness data of the background-image section of a part with which the shadow of the body goes into the image data used as a synthetic backward background in the synthetic location periphery of the body are corrected by the positional information and brightness information of a shadow of said body, and it is characterized by having the process which adds the part of the shadow of the body into the image after body composition.

[0005] The synthetic approach of the shadow in the electronic image concerning claim 2 of this invention is the synthetic approach of the shadow in an electronic image according to claim 1, extracts the body of the data of an image and is characterized by to calculate the average-luminance value of the left-behind back data, and to search for positional information and brightness information as a part of the shadow of the body for a brightness part lower than this average-luminance value as a process which searches for the positional information and the brightness information of a part of a shadow from said back data.

[0006] The synthetic approach of the shadow in the electronic image concerning claim 3 of this invention, It is the synthetic approach of the shadow in an electronic image according to claim 1, and is characterized by calculating the average brightness value of the part which becomes the back's average brightness value and the shadow of the body beforehand, and searching for the positional information and brightness information of the part which can be regarded as a part of the shadow of the body by the numeric value between both brightness values as a process which searches for the positional information and brightness information of a part of a shadow from said back data.

[0007] The synthetic approach of the shadow in the electronic image concerning claim 4 of this invention is the synthetic approach of the shadow in an electronic image according to claim 1, extracts the body of image data and is characterized by to calculate the most values of the luminance distribution of the left-behind back data, and to search for positional information and brightness information for a brightness part lower than these most values as a part of the shadow of the body as a process which searches for the positional information and the brightness information of a part of a shadow from said back data.

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## CLAIMS

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[Claim(s)]

[Claim 1] Image composition by the chroma-key characterized by providing the following The process which extracts the body from the image data photoed before the back of a single color at least, and searches for the positional information and brightness information of a part of a shadow from the left-behind back data The process which corrects the brightness data of the background-image section of a part with which the shadow of the body goes into the image data used as a synthetic backward background in the synthetic location periphery of the body by the positional information and brightness information of a shadow of said body, and adds the part of the shadow of the body into the image after body composition

[Claim 2] The synthetic approach of the shadow in the electronic image according to claim 1 which extracts the body of the data of an image and is characterized by calculating the average luminance value of the left-behind back data, and searching for positional information and brightness information for a brightness part lower than this average luminance value as a part of the shadow of the body as a process which searches for the positional information and brightness information of a part of a shadow from said back data.

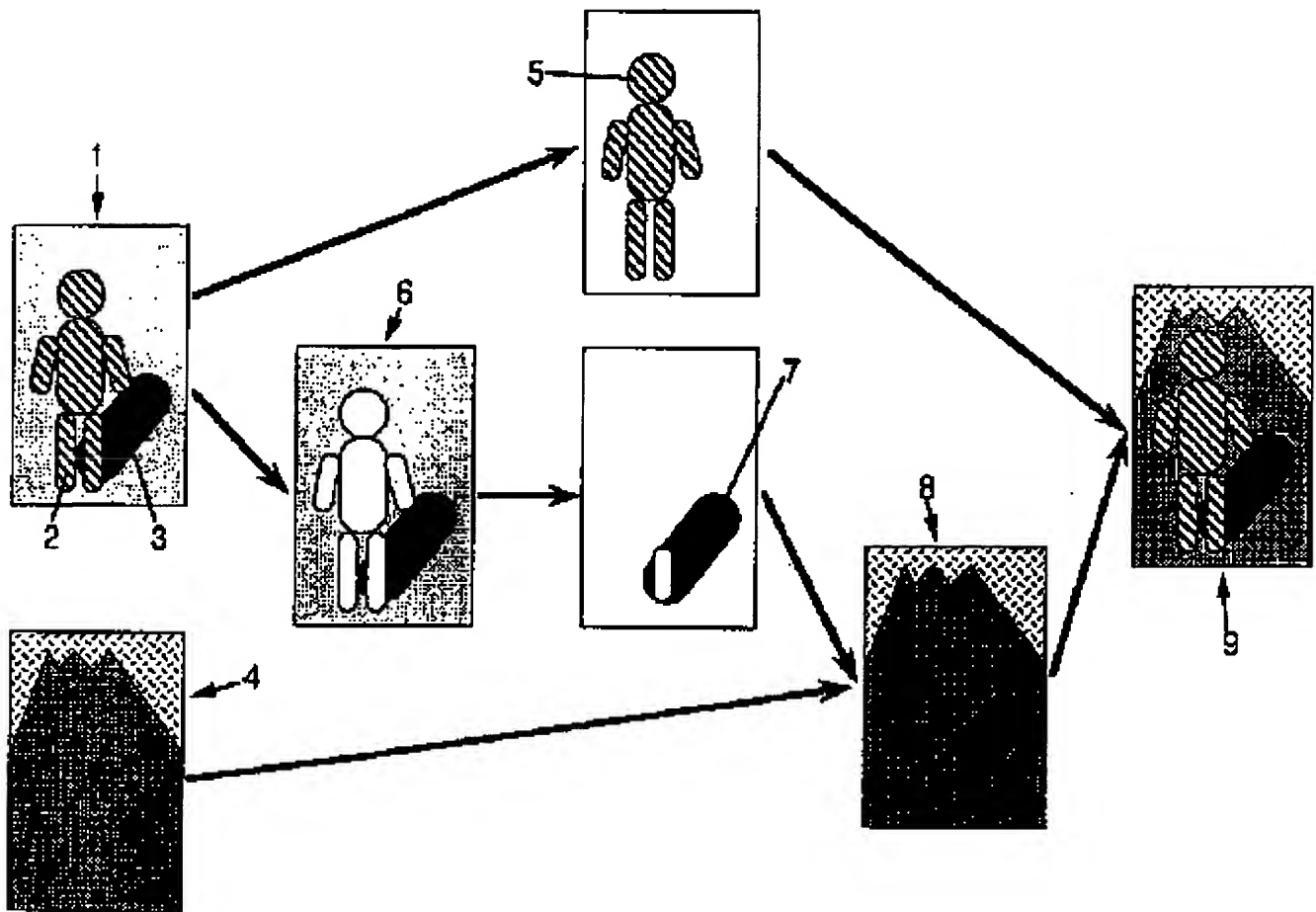
[Claim 3] The synthetic approach of the shadow in the electronic image according to claim 1 characterized by calculating the average brightness value of the part which becomes the back's average brightness value and the shadow of the body beforehand as a process which searches for the positional information and brightness information of a part of a shadow from said back data, and searching for the positional information and brightness information of a part which can be regarded as a part of the shadow of the body by the numeric value between both brightness values.

[Claim 4] The synthetic approach of the shadow in the electronic image according to claim 1 which extracts the body of image data and is characterized by calculating the most values of the luminance distribution of the left-behind back data, and searching for positional information and brightness information for a brightness part lower than these most values as a part of the shadow of the body as a process which searches for the positional information and brightness information of a part of a shadow from said back data.

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